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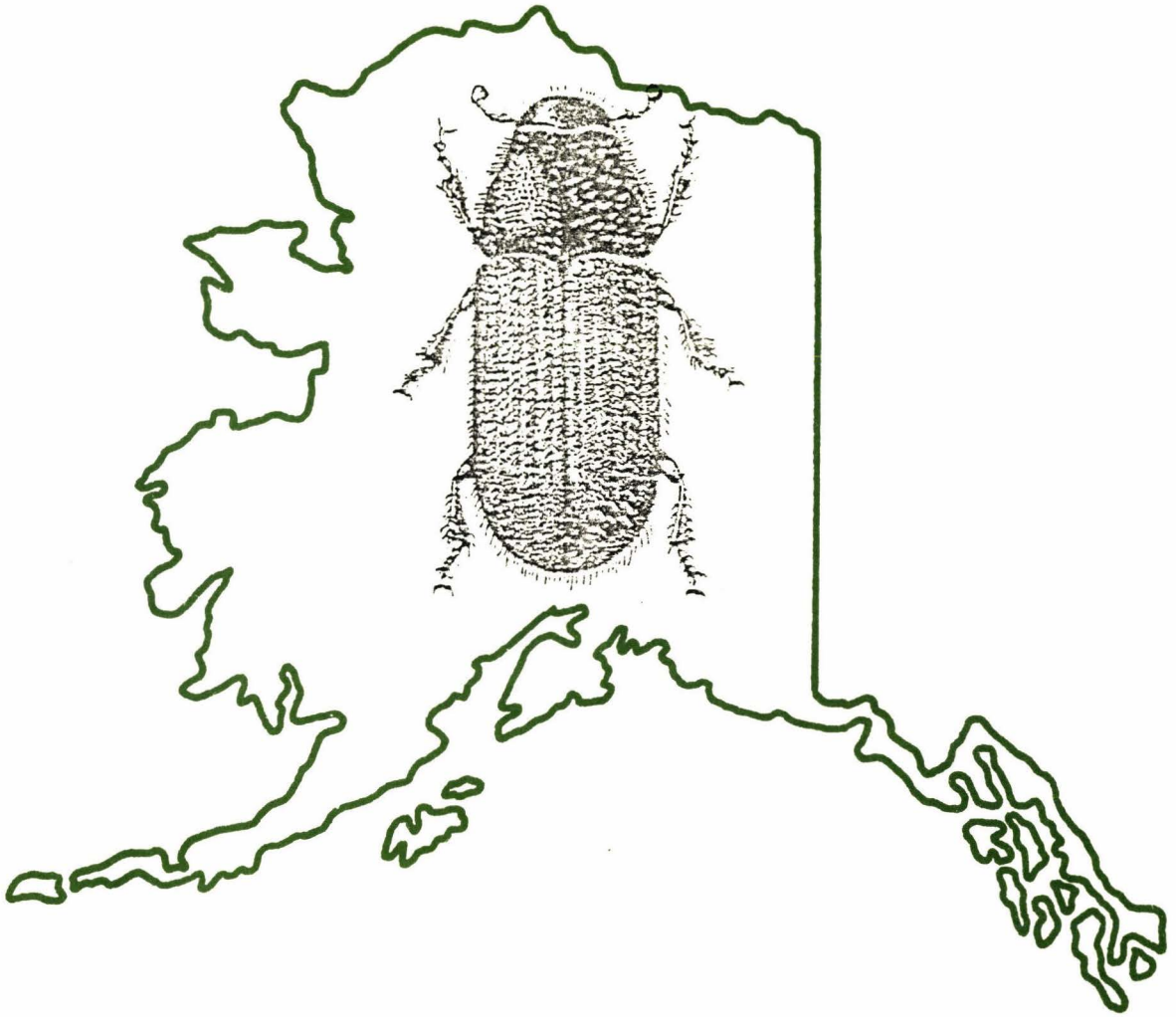
FOREST INSECT AND DISEASE CONDITIONS

IN ALASKA - 1989

December 1989



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FOREST INSECT AND DISEASE CONDITIONS IN ALASKA, 1989

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FOREST PEST CONDITIONS IN ALASKA - 1989

CONDITIONS IN BRIEF

Spruce bark beetle activity decreased in 1989 throughout Alaska. Aerial detection surveys noted 177,000 acres of white, Lutz, and Sitka spruce mortality. Areas of increased spruce beetle activity were most apparent in interior Alaska's white spruce stands. Spruce beetle activity in south-central Alaska, specifically the Kenai Peninsula, has declined. *Ips* populations increased in interior Alaska; approximately 7,000 acres of spruce mortality was apparent. The majority of the new infestations were detected along the Windy Fork and South Fork of the Kuskokwim River.

Hardwood defoliator activity in interior Alaska decreased for the fourth consecutive year. Large aspen tortrix larvae defoliated 11,000 acres of aspen mostly in south-central Alaska. River bottom willow was heavily defoliated (17,000 acres) for the fourth consecutive year along the Mulchatna and Yukon Rivers.

Black-headed budworm defoliation levels in Prince William Sound decreased; 18,932 acres of defoliated western hemlock and Sitka spruce were aerially detected this year vs. 145,000 acres defoliated in 1988. Cottonwood defoliation (leaf beetles and blotch-miners) occurred on 7,000 acres near Valdez and Kings Bay.

Forest insect problems were relatively minor in southeast Alaska in 1989. Spruce bud moth caused light to moderate defoliation on 89,000 acres from Dry Bay to the Yakutat area. The cottonwood leaf beetle defoliated black cottonwoods and willows on 7000 acres along river bottoms in Lynn Canal and the Glacier Bay area. Current spruce beetle mortality was low in Glacier Bay National Park and in the Yakutat Forelands. Defoliators of western hemlock remained at very low levels, producing no visible defoliation in 1989. In sharp contrast to severe defoliation for the two previous years, spruce needle aphid populations crashed during the 1988-9 winter and no damage was detected in 1989.

Wood decays, decline of Alaska-yellow cedar, and hemlock dwarf mistletoe persist as the most important forest diseases of Alaska. More than 390,000 acres of cedar decline have been detected throughout southeast Alaska. Heartrot and buttrot fungi caused significant cull in all tree species in Alaska. Spruce needle cast and most other foliar pathogens occurred at low to moderate levels in 1989. Porcupines continued to damage spruce and hemlock in valuable young-growth stands in southeast Alaska.

STATUS OF INSECTS

SPRUCE BEETLE, *Dendroctonus rufipennis* (Kirby)

Alaska spruce beetle populations decreased in 1989 by more than 200,000 acres; on-going as well as new infestations now cover approximately 177,000 acres throughout south-central and interior Alaska's spruce forests. Increased spruce beetle activity however, was apparent in interior Alaska along the Yukon and Kuskokwim River drainages.

White, Lutz, and Sitka spruce mortality continues on approximately 10,695 acres of the Chugach National Forest; a decrease over the area infested in 1988 (36,000 acres). Spruce beetle activity is most apparent near Summit Lake, Cooper Landing, and the Russian River Campground area. Spruce beetle pressure was extremely high in the Cooper Creek and Russian River Campgrounds where more than 90% of all spruce greater than 5" in diameter has been killed. A reflection of the extremely high beetle pressure was the occurrence of black spruce mortality; trees as small as 3" in diameter were successfully attacked. Black spruce is rarely attacked by the spruce beetle, but when populations are extremely high and preferred hosts (white and Lutz spruce) have been previously killed, beetles have little choice but to attack black spruce. New spruce beetle activity was noted at Upper Trail Lake near the Johnson Pass trail as well as along Cooper Creek up to Cooper Lake.

Spruce beetle activity likewise has decreased on the Kenai National Wildlife Refuge where approxi-

mately 7,000 acres are currently infested; the majority of the infested forested lands occur southwest of Tustumena Lake. Spruce beetle populations have declined along the Fox River Drainaige near Homer: no spruce beetle activity was detected in 1989. However, across Kachemak Bay from Homer, spruce beetle populations are increasing in the Sitka spruce stands of Kachemak Bay State Park where more than 10,000 acres are lightly infested: approximately 1,000 acres are infested in the Halibut Cove Lagoon area; 800 acres near Mallard Bay, and 9,000 infested acres are apparent from Aurora spit to Battle Creek. The spruce beetle is spreading in a northeasterly direction. Spruce beetle activity has declined near Seldovia. Infested trees however, are most apparent in stands bordering recent subdivision roads north of Seldovia.

Spruce beetle activity on the west side of Cook Inlet decreased to endemic levels. However, recent spruce beetle activity was detected on 2,600 acres along the Skwentna River, north of Beluga Lake.

Spruce beetle activity in the Anchorage Bowl and Chugiak-Eagle River areas continues to decrease. Scattered mortality is still evident throughout the spruce-hardwood type on Fort Richardson Military lands and in the spruce stands along upper Ship Creek. The 14,000 acres of scattered spruce beetle activity observed last year near Kings Mountain along the Matanuska River has declined to endemic levels this year. Likewise, the active infestation (19,000 acres) of the last three years between Willow and Little Willow Creeks has decreased to endemic levels.

Lutz spruce killed by spruce beetles,
Kenai Peninsula

The Tiekel River outbreak along the Richardson Highway has decreased by 11,000 acres. Active infestations occur on only 2,300 acres near Pump Station 12. Infestations will continue to decrease in intensity as the spruce beetle has killed the majority of the susceptible host type after more than eight years of activity. Spruce beetle activity however, is increasing in other localities in south-central and interior Alaska. A large spruce beetle outbreak was detected along the Yukon River south of Nulato in

1986. This was the first recorded spruce beetle outbreak north of the Alaska Range. The outbreak continued to expand and by 1989, beetles have infested approximately 140,000 acres. Infestations are scattered throughout the white spruce stands bordering the Yukon River from Anvik to Nulato. Increased spruce beetle activity (5,000 acres) was aerially detected along the Nulato River. Likewise, beetle activity has increased near the mouth of the Koyukuk River where 13,700 infested acres were observed this year. Infestations are expected to intensify and spread along the Yukon in an northeasterly direction during the next few years. Scattered spruce beetle activity continues along the Kuskokwim River on 10,000 acres between Sleetmute, Devil's Elbow and McGrath. Recent spruce beetle infestations were detected southeast of McGrath along Windy Fork and the South Fork of the Kuskokwim Rivers; 2,257 and 3,738 acres, respectively.

1989 spruce beetle infestations throughout south-central and interior Alaska by ownership are as follows: National Forest Land--10,694 acres; State and Private--83,345 acres, and other Federal lands (e.g. Kenai National Wildlife Refuge, National Parks, etc.)--83,210 acres.

In southeast Alaska, spruce beetle activity was low in 1989. Light spruce mortality occurred in the southeastern corner of Glacier Bay National Park, but the total affected acreage did not expand appreciably from the previous year. Slightly over 18,000 acres have been affected in the Park, with mortality ranging from 5 to 75% of the trees in nearly pure stands of Sitka spruce. Small patches of older spruce mortality are evident along the outer coast of Glacier Bay National Park from Dundas Bay to Palma Bay. These patches total less than 500 acres, and do not appear to be expanding.

Few spruce trees were killed by bark beetles during 1989 in the Yakutat Forelands, an area which has experienced light mortality in previous years.

No current spruce beetle activity was noted elsewhere in southeast Alaska.

ENGRAVERS, *Ips perturbatus* (Eichh.)

Engraver infestations were detected on approximately 7,000 acres; an increase of 5,500 acres over 1988. 500 acres of infestation occur within the Bonanza Creek Experimental Forest in spruce stands bordering logging roads and recent timber harvest areas. The majority of the new infested acreage was detected along Windy Fork and the South Fork of the Kuskokwim Rivers. *Ips* activity in this area is mixed with spruce beetle activity. Likewise, increased activity was apparent along the Porcupine River, south of the Kateel River.

SPRUCE BUDWORM, *Choristoneura* sp.

No spruce budworm activity was detected in Alaska's spruce stands in 1989. However, visible defoliation is expected near Copper Center and Palmer in south-central Alaska in 1990. Historically, budworm (*C. orae*) defoliation is prevalent every two years, a reflection of the prolonged budworm life cycle.

LARGE ASPEN TORTRIX, *Choristoneura conflictana* (Wlkr.)

Tortrix populations in interior Alaska declined for the third consecutive year. Defoliation was not apparent in interior Alaska. However, increased activity (11,437 acres) was observed near Copper Center, the Mat-Su Valley, and on the Kenai Peninsula. Increased defoliation is expected in these areas next year.

SPEAR-MARKED BLACK MOTH, *Rheumaptera hastata* (L.)

Black moth populations remained low in 1989. Only 500 acres of birch defoliation were aerially detected in interior Alaska this year. We can expect little or no black moth activity for the next few years.

GYPSY MOTH, *Lymantria dispar* (L.)

One adult male gypsy moth was trapped in Centennial Park Campground on the outskirts of Anchorage in 1987. A thorough ground check of the campground as well as an expanded pheromone trapping program was carried out in 1988. No gypsy moth larvae were found in the Campground and no male adult gypsy moths were captured in the traps.

State-wide pheromone trapping in 1989 did not capture any moths.

TENT CATERPILLAR, *Malacosoma californicum pluviale* (L.)

In 1988, recently introduced tent caterpillars were common on a variety of recently planted landscape materials along the newly completed A Street renovation in downtown Anchorage. All nests and larvae were subsequently treated with insecticide in the latter part of June. The treated area was thoroughly inspected this season for signs of larval feeding. No larvae or signs of feeding were apparent. It appears that the chemical treatment was effective in eradicating this pest.

CLEAR-WING BORER, *Synanthedon culiciformis* (L.)

Clear-wing borer damage to urban, ornamental birch was observed last year. This lepidopteran larva bores into wounded lower tree boles. Larvae feed on phloem tissue thereby weakening the host and providing entry courts for decay fungi. Attacked trees became susceptible to wind damage. 1989 ground surveys detected widespread birch damage throughout the Anchorage Bowl. Subsequent pheromone trapping indicated that the majority of the damage was caused by one species. This was the first collection of this insect in recent times. However, a review of literature showed that one specimen was collected from Alaska birch in the late 1800's.

State-wide pheromone trapping will be undertaken next year to determine the range of this pest of valuable ornamental birch.

Clear-wing borer larva

HEMLOCK SAWFLY, *Neodiprion tsugae* (Middleton)

Populations of the hemlock sawfly were at low levels throughout southeast Alaska in 1989. No visible current defoliation was noted for the second consecutive year and larval counts were relatively low for the third consecutive year.

WESTERN BLACK-HEADED BUDWORM, *Acleris gloverana* (Walsingham)

In 1988, budworm populations dramatically increased throughout Prince William Sound and defoliation was detected on approximately 145,000 acres. Areas most heavily impacted included: Port Fildago and Gravina areas; sw end of Hawkins Island; nw and sw side of Montague Island; all of Green, Knight and Perry Islands; portions of Latouche, Ekington, Evans, Chenega, Naked, Glacier and Culross Islands. This outbreak was surprising with respect to its intensity and magnitude. Budworm defoliation was not detected in 1987.

1989 aerial surveys noted a dramatic but expected decrease in budworm defoliation levels: 18,933 acres vs. the 145,000 acres detected last year. Some top-kill of western hemlock and spruce was noted. Areas with visible defoliation include the northwest part of the Sound from Ester Island to Port Gravina. Perry, Naked, Smith, Green, Knight, Evans, and Latouche Islands all support visible defoliation. Most of this year's budworm activity was limited to forested areas along the shore line. Budworm activity is expected to decline further in 1990.

For the most part, black-headed budworm epidemics are rare in Prince William Sound due to the normally unfavorable climatic conditions for population build-up. 1988's large infestation was probably a result of the unseasonably warm 1987 August and September weather. This is the dispersal and oviposition period of the budworm.

Western black-headed budworm populations were at very low levels in southeast Alaska in 1989. No defoliation was noted, and larvae were present in low numbers, as they were in 1988.

Black-headed budworm larvae, Prince William Sound

SPRUCE BUDMOTH, *Zeiraphera* sp.

Light to moderate defoliation was detected on 89,000 contiguous acres of coastal Sitka spruce stands from Dry Bay to Yakutat. Feeding resulted in dead buds, typically with bud scales remaining on shoots, and dead current-year's needles. Trees will be monitored in 1990 to evaluate if defoliation continues or how trees recover.

SPRUCE NEEDLE APHID, *Elatobium abietinum* (Walker)

Populations of spruce needle aphids crashed during the 1988-9 winter, apparently a result of the near-record cold temperatures. Most spruce trees in the vicinity of Juneau, Sitka, Petersburg, Craig and Klawock that were severely defoliated in 1987 and 1988 recovered this year with new growth.

COTTONWOOD DEFOLIATION, *Chrysomela* sp. and *Lyonetia* sp.

Approximately 6,695 acres of cottonwood were defoliated in Prince William Sound; a decrease of 4,300 acres over 1988 defoliation levels. Similar to last year, the majority (5,605 acres) of the damage occurred near the town of Valdez. 1,090 acres of cottonwood defoliation occurred for the second year at the head of Kings Bay in the Port Nellie Juan area. The causal agents were identified as the cottonwood leaf beetle (*Chrysomela* sp.) and a leaf blotch miner (*Lyonetia* sp.).

The occurrence of both defoliators on cottonwood resulted in widespread, heavy defoliation which may result in limited growth reduction and top kill. Populations are expected to remain high for a few more years followed by a rapid decline.

Defoliation by the cottonwood leaf beetle was noted on more than 7,000 acres in southeast Alaska in 1989. Willows and black cottonwoods were heavily defoliated in several areas including the Takhin, Katzehin, and Chilkoot Rivers and Dry and Berners Bay. Homeowners in the Mendenhall Valley near Juneau also reported heavy defoliation of willows and cottonwoods for the fifth consecutive year.

WILLOW DEFOLIATION, Tortricidae

The area of willow defoliation increased by 12,000 acres over 1988 levels; approximately 17,000 acres of willow defoliation were detected this year. The causal agent has yet to be identified but is believed to be a tortricid larva. The most heavily impacted areas occur near the confluence of the Mulchatna and Nushagak Rivers and along the Yukon River near the town of Stevens Village. Although larval numbers are high in these areas, damage appears to be minimal.

STATUS OF DISEASES

HEMLOCK DWARF MISTLETOE,
Arceuthobium tsugense (Rosendhal) G.N. Jones

Dwarf mistletoe is common in stands of western hemlock throughout southeast Alaska as far north as Haines. Within the range of western hemlock, dwarf mistletoe is absent further west along the Gulf of Alaska. Thus, it should be of no concern in the Chugach National Forest and the Yakutat Ranger District of the Tongass National Forest.

In southeast Alaska, old-growth hemlock stands vary in their level of infestation from absence to other stands where almost every hemlock is infected. Sitka spruce and mountain hemlock are only rarely infected. Heavily infected western hemlock trees have branch proliferations (witches-brooms), bole deformities, and reduced radial growth.

The principle forms of introduction of the parasite into young-growth stands are 1) infected nonmerchantable hemlock trees (residuals) which are sometimes left standing in cut-over areas, 2) infected old-growth hemlocks on the perimeters of cutover areas, and 3) infected advanced reproduction. A demonstration area near Thorne Bay on Prince of Wales Island, Alaska was developed to provide information on the recognition, biology, impact, and recommended silvicultural techniques for managing hemlock dwarf mistletoe in young-growth stands. The killing of infected residual hemlocks (by girdling or felling) and discrimination against advanced reproduction during precommercial thinning and, the care in laying out cutting boundaries to avoid infected old-growth hemlock on clearcut perimeters can help reduce the initial spread to young stands.

SPRUCE NEEDLE CAST,
Lirula macrospora (Hartig) Darker

Spruce needle cast was common on young Sitka spruce and the lower crowns of larger trees throughout coastal Alaska in 1989. It was especially visible in cutover areas and in urban areas. Two-year old needles of spruce had symptoms of severe attack by *L. macrospora* but the incidence on one-year old needles was only moderate this year. Since needles are infected shortly after bud break and emergence in spring, this suggests that the fungus more successfully infected needles in 1987 than in 1988. Fruiting bodies on needles produced in 1987 will be those producing infectious spores next spring (1990); thus 1990 may be another year of heavy infection by the fungus.

SIROCOCCUS SHOOT BLIGHT,
Sirococcus strobilinus Pruess.

The incidence of *S. strobilinus* occurred at moderate infection levels in 1989, although the fungus caused damage in some young-growth stands in southeast Alaska. *S. strobilinus* attacks the shoots of western hemlock and, to a lesser extent, the shoots of Sitka spruce. Young hemlocks in thinned stands have fewer infections than in unthinned stands.

SHOOT BLIGHT OF ALASKA-YELLOW CEDAR,
Apostrasseria sp.

Shoot blight, caused by the fungus *Apostrasseria* sp., was abundant on Alaska-yellow cedar (*Chamaecyparis nootkatensis*) in southeast Alaska this year. The incidence of shoot blight has not changed appreciably over the past several years. Attack by the fungus causes terminal and lateral shoots to be killed back 10 cm or so on seedlings and saplings during winter or early spring.

Lirula macrospora, the fungus that causes spruce needle cast, infects young needles as they emerge in the spring. Symptoms however, do not begin to show until needles are one year old.

SPRUCE NEEDLE RUST, *Chrysomyxa ledicola* Lagerh.

Spruce needle rust was common this year in southeast Alaska. The spores that infect spruce needles are produced on the alternate host, Labrador-tea (*Ledum* spp.), a plant that is common in boggy, poorly drained areas. Therefore, the disease on spruce is usually confined to areas near large muskegs or bogs. Spruce trees rarely, if ever, die from this disease even in years of intense infection.

SPRUCE BROOM RUST, *Chrysomyxa arctostaphyli* Diet.

Spruce broom rust causes perennial infections that result in dense clusters of branches on white, Lutz spruce, Sitka, and black spruce. The incidence of the disease changes little from year to year. It is common wherever spruce grows near the alternate host, bearberry or kinnikinnik (*Arctostaphylus uva-ursi*) in Alaska. The disease is common in interior and south-central Alaska, where scattered individual trees are infected, but only occurs in localized areas of southeast Alaska where the alternate host is common. Top kill or mortality sometimes occur.

HEMLOCK NEEDLE RUST,
Pucciniastrum vaccinii (Rab.) Joerst.

Hemlock needle rust occurred at low, endemic levels this year on needles of western hemlock. The alternate host for this rust fungus is blueberries (*Vaccinium alaskensis* and *V. ovalafolium*), very common components of understory vegetation in hemlock-spruce forests.

WESTERN GALL RUST,
Endocronartium harknessii (J.P. Moore) Hirat.

This rust fungus continued to cause spherical galls on branches and main boles of shore pine. *E. harknessii* is common throughout the distribution of pine in Alaska. Typically, the rust fungus does not kill pine tissues. Another fungus, *Nectria macrospora*, colonized and killed many of the pine branches with these galls this year. In cases where galls were located on the main bole, *N. macrospora* commonly caused top-kill.

Shore pine with a gall produced by the fungus
Endocronartium harknessii

FOLIAGE DISEASES OF CEDARS,
Gymnosporangium nootkatense Arth. and
Didymascella thujina (Durand) Maire

Two fungi that occur on the foliage of cedar, *Gymnosporangium* on Alaska-yellow cedar and *Didymascella* on western redcedar, occurred at low, endemic levels this year. They neither severely defoliated nor killed cedar trees.

ALASKA-YELLOW CEDAR DECLINE

Decline and mortality of Alaska-yellow cedar persists as one of the most spectacular and important forest diseases in southeast Alaska. Some 390,000 acres of decline have been mapped during aerial detection surveys. Concentrated mortality occurs along a wide band from western Chichagof and Baranof Islands to the Ketchikan Area.

Cedar trees have probably died throughout southeast Alaska every year since the onset of the problem about 100 years ago. This year, as with last year, dying discolored trees were particularly common on the southern half of Kuiu Island and the northeast portion of Slocum Arm on Chichagof Island.

All recent research suggests that no contagious organism is the primary cause for this intensive and extensive mortality. Some abiotic (non-living) site factor, probably associated with the poorly-drained anaerobic soils where decline occurs, appears to be responsible for initiating and continuing cedar decline.

The following list of acreage affected by Alaska-yellow cedar decline has been determined from a composite map developed by mapping dead and dying cedar during annual aerial detection surveys conducted over the previous 20 years. Recent research suggests that the total acreage of cedar decline increases very slowly because there is no site-to-site spread of decline. The slow increase in area of cedar decline is a result of encroachment (i.e., <1m/yr) of decline to adjacent stands. Contained within most declining stands are trees that died up to 100 years ago (snags still standing), more recently killed cedars, dying cedars (with yellow, red, or thinning crowns), healthy cedars, and other tree species.

STANDS OF DEAD AND DYING ALASKA-YELLOW CEDAR IN SOUTHEAST ALASKA

	Acres
NATIONAL FOREST LAND	376,005
Chatham Area	110,794
Juneau Ranger District	1,011
Hoonah Ranger District	1,556
Sitka Ranger District	
Chichagof I	33,628
Baronof I	53,738
Kruzof I	15,205
Total	102,571
Admiralty Island Nat'l	
Monument Wilderness	5,656
Stikine Area	165,049
Petersburg Ranger District	
Kupreanof I	61,231
Kuiu I	49,818
Mitkof I	5,333
Woewodski I	2,258
Mainland	5,216
Total	123,856
Wrangell Ranger District	
Etolin I	16,114
Wrangell I	10,275
Zarembo I	8,251
Woronofski I	622
Mainland	5,931
Total	41,193
Ketchikan Area	100,162
Thorne Bay Ranger District	
Prince of Wales I	20,174
Kosciusko I	3,308
Heceta I	685
Total	24,167
Craig Ranger District	
Prince of Wales I	18,889
Suemez I	311
Dall I. and Long I	1,012
Total	20,212
Ketchikan Ranger District	
Revillagigedo I	16,736
Gravina I	1,955
Mainland	12,687
Total	31,378
Misty Fjords Nat'l Mon. Wilderness	
Revillagigedo I	10,198
Mainland	14,207
Total	24,405
OTHER FEDERAL LAND	1,478
Annette I	1,478
NATIVE LAND	9,028
Prince of Wales I	5,370
Kupreanof I	234
Sukkwan I	156
Ketchikan area	3,190
STATE LAND	5,293
Sitka area	1,246
Mitkof I	1,206
Kupreanof I	234
Prince of Wales I	632
Wrangell area	311
Pelican area	156
Ketchikan area	1,508
TOTAL LAND AFFECTED	**391,804**

HEMLOCK FLUTING

Fluting on the boles of western hemlock is common throughout southeast Alaska. Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their boles; a condition that reduces the value of hemlock logs because they yield less sawlog volume and bark is contained in some of the wood. The cause of fluting is not completely known, but researchers have recently explored reasons for this bole deformation and have documented its presence in young hemlock stands and associations with shallow soils.

WINTER DAMAGE

Sitka spruce growing along beach shores suffered from winter damage. Southeast Alaska experienced near-record cold temperatures during the 1988-9 winter. In affected areas, trees were killed or, in many cases, the crown on the north side of affected trees was killed. Damage was noted on the east side of Lynn Canal near Comet, Mansfield Peninsula on Admiralty Island, Taku Inlet and nearby Grand Island, and the east side of Chichagof Island from Tenakee Inlet to Florence Bay.

Young western hemlocks growing in exposed locations throughout southeast Alaska were also damaged during winter. On hemlock, however, only needles were killed and trees refoliated in spring. Whether winter damage on spruce and hemlock was a result of freezing or dessication is not known.

DECAYS

Heartrot fungi cause substantial loss of wood volume in Alaskan forests. The problem is particularly serious in Alaska where long-lived trees in old-growth forests are still predominant and the slow-growing decay fungi have ample time to cause significant losses. In addition, these fungi play a major role in the dynamics and functioning of coastal old-growth forests where fire and most other disturbing forces are uncommon. By predisposing large old trees to bole breakage, they are important disturbing factors that cause small scale canopy gaps.

In southeast Alaska, the following fungi are the most important causes of wood decay:

Sitka spruce-
- *Fomitopsis pinicola* (Schwartz:Fr.) Karst.
- *Phellinus pini* (Thore:Fr.) Pilat
- *Armillaria* sp.
- *Phaeolus schweinitzii* (Fr.) Pat.
- *Laetiporus sulphureus* (Bull. ex Fr.) Bond. et Sing.

Western hemlock-
- *Fomitopsis pinicola*
- *Armillaria* sp.
- *Heterobasidion annosum* (Fr.) Bref.
- *Laetiporus sulphureus*
- *Phaeolus schweinitzii*
- *Phellinus robustus* (Karst.) Bourd & Galz.
- *Phellinus pini*

Western redcedar-
- *Poria albipellucida* Baxt.
- *Phellinus weirii* (Murr.) Gilbn.

Heartrot incidence among hardwood species on the Kenai Peninsula is generally high. *Pleurotus* sp. and *Pholiota* sp., which form annual sporophores, commonly occur on trembling aspen, black cottonwood, and paper birch, but are not as common as heartrot fungi that form perennial sporophores on these tree species. *Phellinus igniarius* and *Fomes fomentarius* account for the majority of decay in paper birch, with *P. igniarius* being the most important both in terms of incidence and decay volume. *Phellinus tremulae* accounts for the majority of decay in both trembling aspen and black cottonwood. Due to the general exclusion of fire from the Peninsula, the hardwood species occurring in either hardwood or mixed conifer/hardwood forest cover types are typically mature to overmature. Heartrot incidence is almost always high in mature stands and decay is almost universally present in hardwood stems of overmature trees.

Heartrots are also common in conifer species on the Kenai Peninsula. In mature stands of mountain hemlock, *Phellinus pini* is the most common heartrot fungus based on external indicators, with sporophore incidence frequently exceeding 10 percent. Sporophores of *Echinodontium tinctorium* have been observed much less frequently. *Phellinus pini* is less common on white, Lutz, and Sitka spruce. However, decay volumes in all conifer species are probably much higher than is indicated by the presence of *P. pini* sporophores. In spruce stands that have experienced extensive top break-

age due to heavy snow and ice loads and/or high winds, volume loss due to decay by *P. pini* commonly exceeds 20 percent and can be much higher.

At least 20 percent of trees attacked by spruce beetles 5-10 years ago contain advanced decay. Actual percentage of losses may be much higher. A number of decay fungi are associated with spruce beetle-killed spruce, but *Fomitopsis pinicola* is the most consistent associate.

Relatively little is known of the incidence of root and butt rot pathogens of spruce on the Kenai Peninsula. Results of an extensive survey initiated in 1988 are still in development. To date, there is no indication that either *Armillaria* sp. or *Heterobasidion annosum* cause any significant growth or volume losses. *Inonotus tomentosus* has been encountered occasionally, but mortality is generally confined to small pockets of 5-10 trees.

A yellow stringy butt rot of the white spruce species (white, Lutz, and Sitka) is common throughout the Peninsula. Incidence of this rot typically ranges from 5-20 percent in stands. The fungus associated with this decay has not yet been positively identified, but it is thought to be a *Scytinostroma* species. Decay is usually confined to the central portion of heartwood in the lower 3-5 feet of the bole. Lineal extent of decay in the bole is thus limited, but volume loss may be significant.

STATUS OF ANIMAL DAMAGE

PORCUPINE, *Erethizon dorsatum*

Porcupines continued to cause damage to all conifer species in coastal Alaska. Porcupines damaged smaller trees by removing bark along the entire bole. On larger trees, porcupines cause basal injury. Damage is especially serious on Mitkof Island in southeast Alaska.

BROWN BEAR, *Ursus arctos*

The lower boles of Alaska-yellow cedar trees were wounded in spring on Baranof and Chichagof Islands, particularly in the Peril Strait and Slocum Arm areas. Other tree species were unaffected. Trees with old scars have associated columns of wood decay that will limit the value of butt logs from scarred trees.

WESTERN REDCEDAR TOPKILL

Girdling by an unidentified animal (perhaps squirrels) has caused topkill on western redcedar in recent years. This year, damage was concentrated in the vicinity of Menefee Inlet on Etolin Island.

1989 FOREST INSECT AND DISEASE INFESTATION IN ALASKA BY LAND OWNERSHIP AND PEST IN ACRES

PEST	NATIONAL FOREST	OTHER FEDERAL	NATIVE	STATE & PRIVATE
Spruce Beetle *Dendroctonus rufipennis*	10,695	83,710	25,901	57,444
Engravers *Ips perturbatus*		14		6,884
Large Aspen Tortrix *Choristoneura conflictana*		4,713	850	5,874
Spear-Marked Black Moth *Rheumaptera hastata*				467
Black-headed budworm *Acleris gloverana*	15,338		3,595	
Spruce budmoth *Zeiraphera* sp.	78,430	9,920		
Cottonwood Defoliation	8,404	4,524		1,560
Willow Defoliation		8,481	2,036	6,445
Alaska-yellow cedar Decline	376,005	1,478	9,028	5,293
Winter damage (Sitka spruce)	5,424			
High Water Damage	856		78	
Totals:	**495,152**	**112,840**	**41,488**	**83,967**

State Total (Insects and Disease)*: 733,447

*These values do not include many of the most destructive diseases (e.g., wood decays and dwarf mistletoe) because these losses are not detectable in aerial surveys.

INTEGRATED PEST MANAGEMENT ACTIVITIES

Integrated pest management has been described as a "systems approach to reducing pest damage to tolerable levels through a variety of techniques, including predators and parasites, genetically resistant hosts, natural environmental modifications and, when necessary and appropriate, chemical pesticides." Considering the broad parameters offered by this definition a listing a Region 10 IPM acitivities conducted by FPM is as follows:

(1) Participation in a cooperative effort with Alaska Agricultural Research Station and the Cooperative Extension Service to provide pest management information to Alaska residents. The program which includes education, research and survey activities, provides integrated pest management information concerning urban forestry and garden and greenhouse pests. This program includes a Teletip recorded message service as well as an IPM Newsletter which is published monthly throughout the summer.

There were seven full-time and one half-time pest scouts employed from May until the end of September in Fairbanks, Delta Junction, Palmer, Anchorage, Juneau, Soldotna, and Kodiak. In addition, there are four Extension Agents working with the program.

(2) A selective cut and fertilization study was continued this fall on a 9 acre island directly across from the Granite Creek Campground (Chugach National Forest) which had been set aside for research purposes. Two and one-half acres of mature spruce forest were thinned and all thinned material will be removed next spring. The purpose of the thinning is to determine which treatments or combination of treatments (thinning & prunning) will increase the vigor of the residual spruce thereby reducing their susceptibility to spruce beetle attack.

(3) The testing of diesel with and without carbaryl as a remedial spray for the reduction of spruce beetle brood in infested spruce was continued this summer on the Kenai Peninsula. Although efficacy data have not yet been analyzed, preliminary findings indicate that both carbaryl (Sevin 80-S) with diesel was effective in killing all life stage of the spruce beetle.

(4) Research studies have demonstrated that the removal of the lower third of the live crown of spruce provides increased resistance to the spruce beetle. Both attack density and survival of beetle brood are reduced through prunning. A pilot study of this vegetative management practice was initiated this fall in cooperation with the Seward Ranger District, Chugach National Forest. All spruce greater than 5" dbh in the Quartz Creek and Tern Lake campgrounds were prunned. Some thinning was also undertaken. Two additional campgrounds are slated for treatment this winter or next fall.

(5) A cooperative (PSW/INF/FPM) standing lethal trap tree study was continued this summer. The objective of this study was to determine the efficacy of using carbaryl treated uninfested spruce baited with synthetic aggregating pheromone as lethal traps to suppress spruce beetle populations. Preliminary results indicated that chemical treated trap trees can effectively reduce the number of standing infested trees.

(6) Based on the above lethal trap tree research study, a cooperative (FPM/Seward Ranger District) Pilot Study was established along the Seward Highway near Summit Lake. Thirty acres of heavily infested spruce were treated. Although infestations continue in the treated area, the number of infested spruce was half that of untreated check areas.

SUBMITTING INSECTS AND DISEASES FOR IDENTIFICATION

People interested in obtaining identification of insect and disease specimens should submit samples to specialists. The following procedures for the collection and shipment of specimens should be used:

I. Specimen collection:

1. Adequate material should be collected
2. Adequate information should be noted, including the following:
   a. Location of collection
   b. When collected
   c. Who collected the specimen
   d. Host description (species, age, condition, # of affected plants)
   e. General description of area (eg, old or young forest, bog, urban); unusual conditions (e.g., frost, poor soil drainage, mis-application of fertilizers/ pesticides?).
3. Personal opinion of the cause of the problem is very helpful

II. Shipment of specimens:

1. General: Pack specimens in such a manner to protect against breakage.
2. Insects: If sent through the mail, pack so that they withstand rough treatment.
   a. Larvae and other soft-bodied insects should be shipped in small screw-top vials or bottles containing at least 70% isopropyl (rubbing) alcohol. Make certain the bottles are sealed well. Include in each vial adequate information, or a code, relating the sample to the written description and information. Labels inserted in the vial should be written on with pencil or India ink. Do not use a ballpoint pen, as the ink is not permanent.
   b. Pupae and hard-bodied insects may be shipped either in alcohol or in small boxes. Specimens should be placed between layers of tissue paper in the shipping boxes. Pack carefully and make certain that there is very little movement of material within the box. Do not pack insects in cotton.
3. Needle or foliage diseases : Do not ship in plastic bags. Sprinkle lightly with water before wrapping in newspaper. Pack carefully and make sure that there is very little movement of material within the box. Include the above collection information. For spruce and other conifers, include a description of whether current year's-needles, last-year's needles, or old-needles are attacked.
4. Mushrooms and conks (bracket fungi): Do not ship in plastic bags. Either pack and ship immediately, or first air dry and then pack. To pack, wrap specimens in dry newspaper and pack into a shipping box with more newspaper. If on wood, include some of the decayed wood. Be sure to include all collection information.

III. Shipping:

1. Ship as quickly as possible, especially if specimens are fresh and not air-dried. If samples cannot be shipped rapidly, then store in a refrigerator.
2. Include address inside shipping box.
3. Mark on outside: "Fragile: Insect-disease specimens enclosed; For scientific purposes only; No commercial value."

FOREST INSECT AND DISEASE
BIOLOGICAL EVALUATIONS, TECHNICAL REPORTS, AND MISCELLANEOUS PUBLICATIONS

Eglitis, A.E. 1989. Permanent plots for monitoring spruce mortality in the Yakutat Forelands. USDA For. Serv., Alaska Region, FPM Tech. Rpt. R10-89-16. 17pp.

Gray, D.R., Holsten, E.H., and M. Pascuzzo. 1990. Effects of semiochemical baiting on the attractiveness of felled and unfelled lethal trap trees for spruce beetle (Coleoptera:Scolytidae) management in areas of high and low beetle populations. Can. Ent. (In Press).

Hard, J.S. 1989. Sequence of trees attacked by spruce beetles in a mature even-aged spruce stand in south-central Alaska. Northwest Science. Vol.63(1):5-12.

Hennon, P.E. 1990. Fungi on *Chamaecyparis nootkatensis*. Mycologia 82(1):59-66.

Hennon, P.E. 1990. Sporulation of *Lirula macrospora* and symptom development on Sitka spruce in southeast Alaska. Plant Disease 74: In press.

Hennon, P.E.; E.M. Hansen; C.G. Shaw III. 1990. Causes of basal scars on *Chamaecyparis nootkaensis* in southeast Alaska. Northwest Science 64(2): In press.

Hennon, P.E.; E.M. Hansen; C.G. Shaw III. 1990. Dynamics of decline and mortality of *Chamaecyparis nootkatensis* in southeast Alaska. Can. J. Bot. 68: In press.

Hennon, P.E.; C.G. Shaw III; E.M. Hansen. 1990. Dating decline and mortality of *Chamaecyparis nootkatensis* in southeast Alaska. Forest Science 36: In press.

Hennon, P.E.; C.G. Shaw III; E.M. Hansen. 1990. Symptoms and fungal associations of declining *Chamaecyparis nootkatensis* in southeast Alaska. Plant disease 74: In press.

Holsten, E.H. 1988. North Shore Kenai Lake 1988 conventional trap tree project/spruce beetle. USDA For. Serv., Alaska Region, FPM Bio. Eval. R10-88-2. 10pp.

Holsten, E.H. 1989. North Shore Kenai Lake. Efficacy of a fuel oil remedial treatment against spruce beetles. USDA For. Serv., Alaska Region, FPM Tech. Rpt. R10-89-17. 5pp.

Holsten, E.H. and R.A. Werner. 1990. Comparison of white, Sitka and Lutz spruce as hosts of the spruce beetle in Alaska. Can. Journ. of Forest Research (In Press).

Reynolds, K.M. 1990. Preliminary classification of forest vegetation of the Kenai Peninsula, Alaska. USDA For. Serv., Pac. NW Res. Station, Research Paper (In Press).

Reynolds, K.M. 1990. Relations between spruce beetle activity on Lutz spruce and blue-staining. For. Ecol. Manag. (In Press).

Reynolds, K.M. and J.S. Hard. 1990. Risk and hazard of spruce beetle attack in unmanaged stands on the Kenai Peninsula, Alaska under epidemic conditions. For. Ecol. Manag. (In Press).

USDA Forest Service. 1988. Forest Insect and Disease Conditions in Alaska -1988. Forest Pest Management, State and Private Forestry, USDA Forest Service. Alaska Region. Juneau, Alaska. Forest Pest Conditions Report R10-88-C-1. 16 pp.

Werner, R.A., Hard, J.S. and E.H. Holsten. 1988. The development of management strategies to reduce the impact of the spruce beetle in south-central Alaska. The Northwest Environ. Journ. 4(2):319-323.

Zogas, K.P. 1989. Re-evaluation of Daconate and Silvisar for lethal trap trees in Alaska. Forest Pest Mgt. Tech. Rpt. R-10-89-17. 9pp.

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MAILING LIST UPDATE AND REVISION - Annual Report 1989

At this time, we wish to update our mailing list of all cooperators. Only those persons or agencies returning this form by June 15, 1990 will receive subsequent mailings of reports. Please complete this form and return to:

Forest Pest Management
USDA Forest Service
201 E. Ninth Ave., Suite 201
Anchorage, Alaska 99501

Your current address:

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I would like to receive the following publications:

O Entomology biological evaluations
O Pathology biological evaluations
O Technical reports - entomology
O Technical reports - pathology
O Forest Pest Management Annual Reports